



Sawyer Products – Water Bottle Filter

www.sawyerproducts.com

Device Information

The Sawyer water bottle filter is a handheld sports type squeeze bottle. The bottle has a capacity of 0.65 L (22 oz.). The bottle contains an activated carbon pre-filter and a 0.2 μm hollow-fiber primary filter. The pre-filter sits near the bottom of the bottle and is connected to the primary filter's plastic housing. The pre-filter is removable. The primary filter is connected to the drink spout by flexible tubing. The activated carbon pre-filter is an 8 cm (L) x 3 cm (Dia) hollow-core cylinder with a 0.6 cm thick wall. The pre-filter is enclosed in plastic housing. There are openings in the plastic housing in the bottom 1.5 cm and water flows from outside through the filter wall into the hollow inside and out to the primary filter. The primary filter is a 0.2 μm polysulfone hollow fiber filter. The hollow-fibers are packed into a plastic housing and the open ends are oriented at the top of the housing. Water from the pre-filter flows into the primary filter housing, and then from the outside of the hollow fibers to the inside, out the open ends into the drink spout. The top of the primary filter cartridge is sealed with a hard plastic with openings for the hollow fiber ends. This forces water to flow through the hollow fibers. Directions for use require the user to simply fill with water to the recommended fill line. The Sawyer water bottle filter comes with three pre-filters and extra tubing.

Effectiveness Against Microbial Pathogens

No testing data, independent or otherwise, using the USEPA Guide Standard and Protocol for Testing Microbiological Water Purifiers (reference 1) was received for this device. Independent testing data was obtained from the manufacturer website showing bacteria, *Giardia*, and *Cryptosporidium* reduction (reference 2). Results showed >6-log reduction in bacteria and >5-log reduction in cysts using 100 mL of pathogen spiked "stream" water. The data received and general knowledge of membrane filtration (references 2, 3) indicate that this device should be capable of consistently meeting the minimum 6-log bacteria reduction and 3-log reduction for *Giardia* cysts and *Cryptosporidium* oocysts stated in the USEPA Protocol. It is not expected to consistently reduce viruses (4-log reduction). Based on general knowledge of size exclusion by membrane filtration, the Sawyer Water Bottle is assigned one \checkmark for bacteria reduction, one \checkmark each for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts. The device receives an X for virus reduction (for an explanation of the rating checks [click here](#)).

Table. Expected Performance Against Microbial Pathogens.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	> 6-log	√	size exclusion
Viruses	> 4-log	X	-
<i>Giardia</i> cysts	> 3-log	√	size exclusion
<i>Cryptosporidium</i> oocysts	> 3-log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is a squeeze bottle, the actual production rate is dependent on the user. The production capacity of the device is stated to be approximately 300 L. However, production capacity will vary widely with raw water quality (e.g., turbidity).

Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filters (pre-filter and primary). When the pre-filter becomes clogged they can be replaced (up to two times). However, replacement primary filters are not sold separately and therefore, the entire device must be replaced. For practical purposes, the filter cartridges are not cleanable. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight (including extra pre-filters and tubing)	160 grams
Size (height x diameter)	27 cm x 7 cm

Cost

Bottle with extra pre-filters and tubing	\$36.00
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Device Evaluation

No data was received that challenged the Sawyer Water Bottle against the USEPA Protocol (reference 1). The limited data obtained from the manufacturer website, as well as general knowledge of size exclusion by membrane filtration, indicate that the device should be capable of consistently reducing bacteria, *Giardia* cysts and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1. The testing data received was for challenging the device against 100 mL of pathogen spiked water. This data gives no indication of the long term efficacy of this filter against pathogens or turbid water. This device is not expected to consistently reduce viruses (4-log). Additional treatment is necessary to remove viruses such as adding a disinfectant (e.g., chlorine, iodine, chlorine dioxide) to the water after filtration. The activated carbon prefilter should reduce source water taste and odor. This device, like all filters with small pore sizes, is highly affected by turbid (cloudy) waters. Since the device is not able to be backwashed to remove accumulated particles, once clogged, the filter must be replaced. There is no indicator of process failure or end of device useful life.

Advantages

- Expected to consistently provide adequate protection from bacteria, *Giardia* cysts, and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA protocol is not available.
- No wait time prior to consumption.
- Simple and effective.
- Provides taste and odor reduction.

Disadvantages

- No data testing this device against the USEPA Protocol (reference 1).
- Not expected to be consistently effective against viruses.
- Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.
2. Laboratory challenge data obtained from the manufacturer website.



3. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.

